

Planetary Atmospheres Minor Species Sensor (PAMSS)



Problem

- Trace gas sensing is addressed, relevant to atmospheric chemistry and for detection of biologic activity.
- Requested flights will test PAMSS over extreme temperatures and pressures and wide range of gas concentrations.
- Potential use of matured PAMSS include Earth and Planetary Science Missions, Launch Safety, Medical Breath Analysis, and Explosives detection.

Team

- PI: Robert Peale, University of Central Florida, robert.peale@ucf.edu.
- Funding from Florida Space Institute (Sreela.Mallick@ucf.edu).
- Partners in development: EMX International LLC. Tim Arion (arion@emxintl.com)

Proposed Flight Experiment

Experiment Readiness:

- PAMSS will be ready for flight in 6 months.

Test Vehicles:

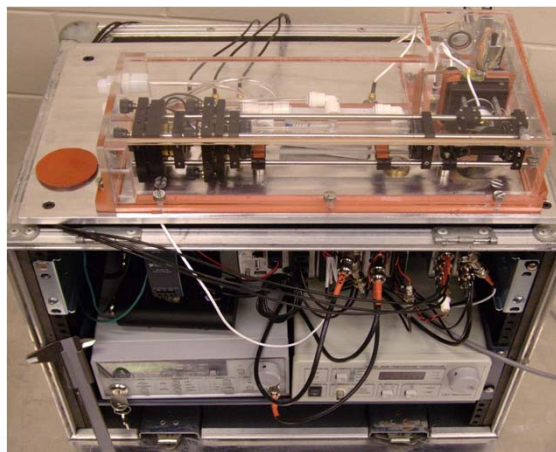
- High-altitude balloons (Small Balloon System)

Test Environment:

- No previous flights. Flight Opportunities request seeks low-temperature low-pressure demonstration of trace gas sensing in actual environment with autonomous operation to raise Technical Readiness Level from TRL4 to TRL6.

Test Apparatus Description:

- Autonomous mid-IR intracavity laser absorption spectrometer consisting of compact optical system and electronics.



Maturation

- TRL5 Success Criterion: Operation and detection of target gas in outdoor ambient at sea level.
- TRL6 Success Criterion: Autonomous operation and trace gas detection over a 10 km range in altitude.
- Steps and timeline: (1st 6 mo.) Electronics integration, implement dynamic alignment, thermal management for low-T environment, battery power, simulated altitude tests. (2nd 6 mo.) Two balloon flights, with corrective actions in between.

Experiment Objective

- Expected flight data will demonstrate continuous autonomous trace gas sensing for 6 hours up to 30 km altitude, as pressure and concentration drop two orders and temperature drops by 70 C.
- These data will be used to ready PAMSS for operation on (e.g.) future planetary missions in extreme environments.